With the writer's compliments. Edgar A. Tyrrell

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SOME CLINICAL OBSERVATIONS ON BLOOD PRESSURE WITH SPECIAL REFERENCE TO THE EFFECT OF PROSTATIC MASSAGE.[1]

BY

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In discussing the subject of blood pressure from clinical standpoints I do so not with the intent of adding anything especially new to our general knowledge of this very important subject, unless it be the effect of prostatic massage. Altered blood pressure must be considered a symptom or state and not a disease. It is dependent upon such a variety of conditions that its clinical interpretation is often difficult and sometimes misleading. Several years ago in a discussion on this subject I heard it stated that nitroglycerine and nitrites in general have only a transitory effect in lowering blood pressure due to arterial disease or other causes. My experience at least seemed to me to be different. I had repeatedly noted what I thought permanent or prolonged changes in the character of the pulse under the use of the nitrites. At the time of the discussion I had no definite data at hand with which to substantiate my opinion and since that time I have not been so active in keeping records as perhaps I should.

[1]Read by invitation, Kalamazoo (Mich.) Academy of Medicine.

There are many recorded observations of the changes which occur in blood pressure after the administration of a dose of nitroglycerine. There is always a quick and marked fall and a gradual return to the normal point, the whole phase lasting not longer than fifteen or twenty minutes. Accordingly this drug has been employed chiefly for its transient effect, as for instance in attacks of angina pectoris, asthma, or apoplexy. In looking over my cases I have picked out a few that will serve to illustrate the points I wish to consider this afternoon.

I think the majority of observers are of the opinion that the sense of touch is not trustworthy for comparative blood pressure records, although no less an authority than Sir William Broadbent emphatically stated at the Toronto meeting of the British Medical Association, that the educated finger is better than any instrument. By this method we make a note today of a blood vessel being straight or tortuous; its tension high, good, fair, or low; its quality full, small, quick, rapid or thready; its bulk plainly felt after compression, and tomorrow, or more frequently several days later we make another observation with only our memory to serve us as a comparison of the degree of alteration. The feeling of many pulses in the interim has doubtless distorted our accuracy of judgment.

In making blood pressure records I have frequently found my previous opinion of the character of the pulse altered by its expression in millimeters of mercury. The hard full pulse with an up stroke that strikes the finger with quick force is never misinterpreted. It is always one that goes with high tension. Shading differences of such a pulse are difficult to recognize. For the most of us some instrumental means of

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recognizing small as well as great changes is most satisfactory. Instruments which eliminate as far as possible the personal equation should be chosen. The study of a pulse tracing made with the sphygmograph gives an idea of the pressure at a glance. It does not however unless in conjunction with a mercury manometer, give any trustworthy record of changes that can be expressed. The chief use of the sphygmograph is for recording and interpreting the movements of the heart and the blood coursing through the blood channels.

The mercury manometer is the only instrument of precision we have at our command for clinical records. It is now well agreed that the best form of apparatus is one after the idea of the Riva Rocci machine with wide armlet, 12 cm's. These instruments register the systolic pressure and may be connected with a tambor and chymograph for the registration of the diastolic pressure. The systolic pressure is obtained by taking the reading after the first return of the pulse. The diastolic registers the maximum pulsation of the artery and is always considerably lower than the systolic. When a blood pressure is reported it is usually understood to be systolic unless otherwise stated.

The force of the heart, the resistance against which it acts, nervous, and psychic influences are the factors which sustain and alter blood pressure. All of these factors must be considered when we endeavor to interpret the estimated blood pressure in a given case. Under normal conditions the pressure is higher after exertion, higher after sitting than after lying. There is always a tendency for the pressure to assume a level. This is well illustrated in the case of the athlete. At the beginning of a forced run there is an enormous rise in the pressure due to the enforced heart strain. This gradually sinks and assumes a new level when the runner gets his so-called second wind, and returns to normal after the run. The same is true, but to a less extent, of the patient who comes to the office for observation. When he enters, particularly if he has come up a flight of stairs, his pressure is often ten or fifteen millimeters higher than after he has remained quiet for a few minutes. The effort of taking off the coat and rolling up the sleeve gives a record on the manometer several points in advance of the record obtained during rest. In making permanent records it is therefore necessary to record a pressure level. The pressures I will report are all pressure levels. My plan is to take the pressure immediately after taking off the coat and twice after having remained quiet for five or ten minutes, the last two records must harmonize closely.

Suggestion has a powerful effect on arterial pressure. A man is sitting quietly reading a book, something he reads causes a quick uncontrollable flush to come into his face, something has momentarily lowered his pressure. The effect of mental emotion on blood pressure has been well illustrated by the classical case of John Hunter, the victim of angina pectoris who said "My life is in the hands of any rascal who chooses to annoy and tease me." Unconsciously in susceptible individuals momentary changes may be produced by the attitude we assume toward them. The increased blood in the splanchnic system during the digestion of a meal causes lowering of the peripheral blood pressure. Normally there is always a balance maintained; but in those individuals who complain of chilliness and clammy hands after meals there is an over balance on the

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splanchnic side amounting to stagnation. On the other hand anything producing constriction of the splanchnic vessels causes a rise in pressure. A few days ago I was called to see a patient with subinvolution of the uterus. I had a book bound very tightly above the uterus. In an hour's time the patient's face became red and she complained of severe headache. Loosening the bandage stopped the headache. This can be explained on the same grounds as Oliver's test for the differentiation of undue splanchnic congestion. Oliver observed that when a weight is placed over the abdomen of a patient with subnormal pressure due to hypotonia an elevation of blood pressure results from the dislodgement of stagnated blood in the abdomen.

Curschmann has shown that pain produces a rise in blood pressure. When he applied the Faradic current over the upper part of the thigh in normal persons and malingerers a distinct rise in pressure occurs, whereas in hysteria and spinal disease the pressure is unchanged. An attack of angina pectoris occurred in a patient while Norris was taking his blood pressure. He noted a rapid rise of fifty mm., followed by gradual fall coincident with the disappearance of the pain. It has also been demonstrated by Beyer, Rhomberg, and Miller that pleasurable emotions, agreeable odors and tastes produce marked peripheral vasodilation, while excitement, worry, unpleasant odors, tastes, noises, and other sensations bring about vaso-constriction. Stimulation of the sciatic nerve by the Faradic current increases blood pressure. Mental pain such as that present during an attack of melancholia induces hypertension which disappears with relief from the state of anxiety. It is also quite well known that the motor excitement of mania causes hypotonia, the reverse of the condition found in melancholia.

Effect of Prostatic Massage on Blood Pressure.

A short time since I examined a patient who complained of some urinary symptoms. I found that he had a slightly enlarged prostate which I massaged for one or two minutes. I had previously taken his blood pressure and decided to take it again. I was interested to note a distinct lowering in the pressure. The prostatic massage experiments which I report this afternoon were planned in the beginning to control my first observation which I thought might be due to some instrumental defect. It will be seen from the illustrations that similar and definite changes occur in the three cases cited.

Charts 1, 2 and 3 are from records of the same individual. This patient, male, aged 62, had a distinct hypertonia, subject to considerable variation under nervous and psychic influences. The effect of posture was also marked.

Exp. 1. The prostate was only slightly enlarged, the groove was not obliterated, both lobes were tense, manipulation produced distinct clear moisture in the anterior urethra and distinct lessening in the size of the organ. The manipulations were continued 3 minutes, 3 minutes later a pressure record was taken and a fall of over ten millimeters recorded. The patient then sat up, after ten minutes the pressure resumed the normal point.

Exp. 2. The second observation was made a week later. This time the massage was continued only 1½ minutes. An observation was made one minute later and the same reading was obtained, in four minutes a fall of 15 millimeters was recorded and in ten minutes the pressure was back to the previous lying pressure. One minute after sitting up the pressure assumed the sitting pressure previously ob-

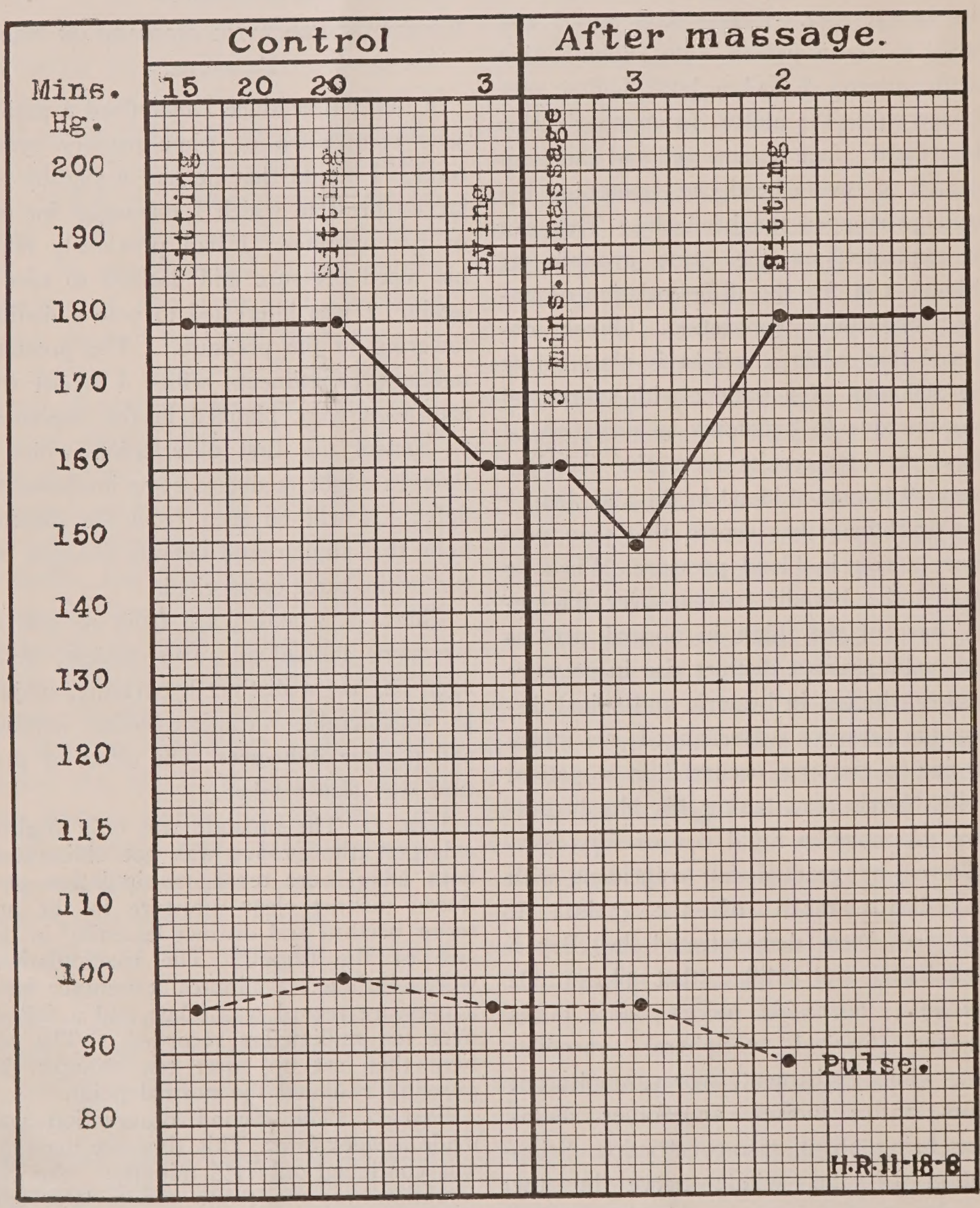

Chart 1. Case I.

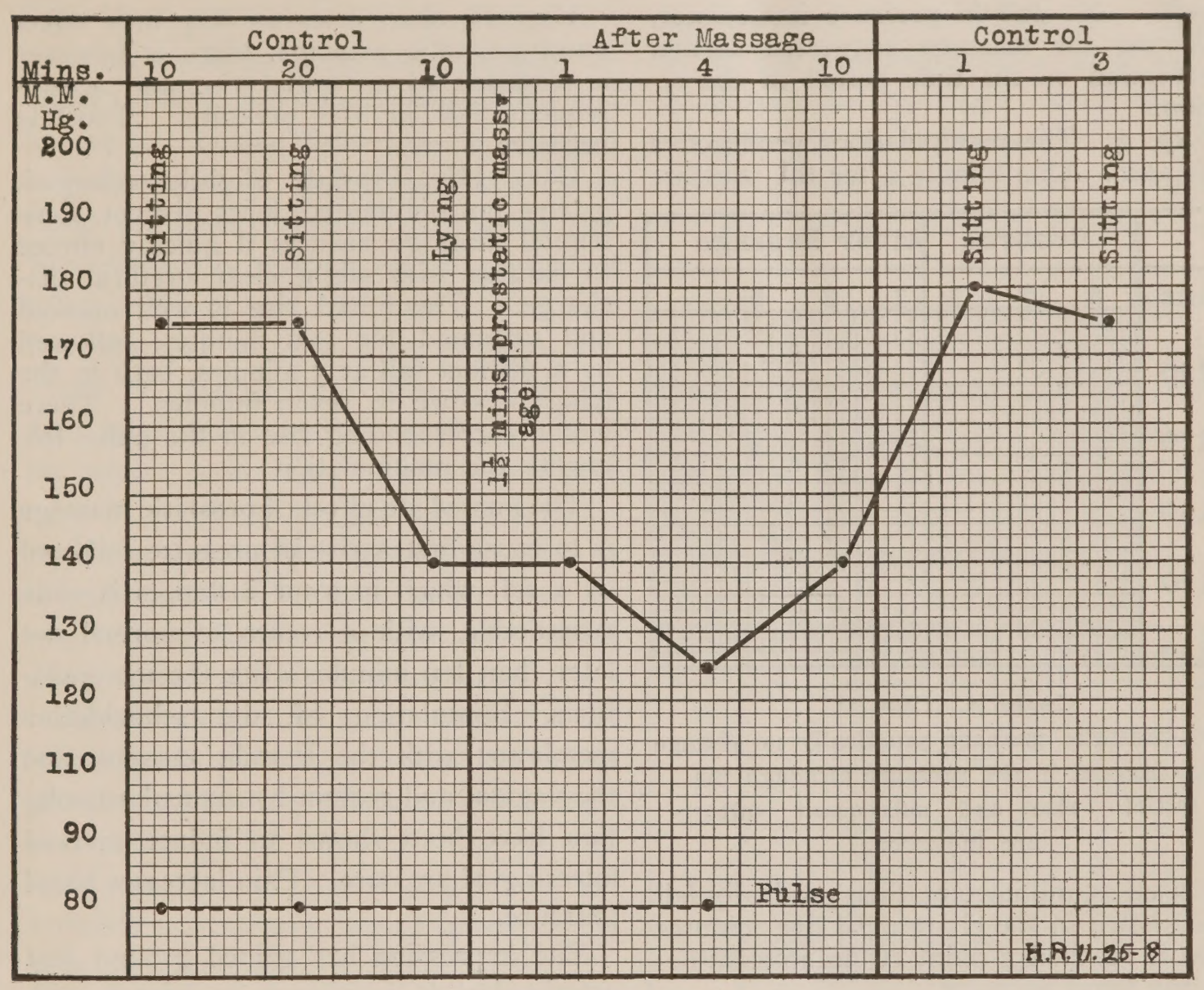

CHART 2. CASE I.
This chart shows the marked effect of posture commonly seen in hypertonia as well as of prostatic massage.

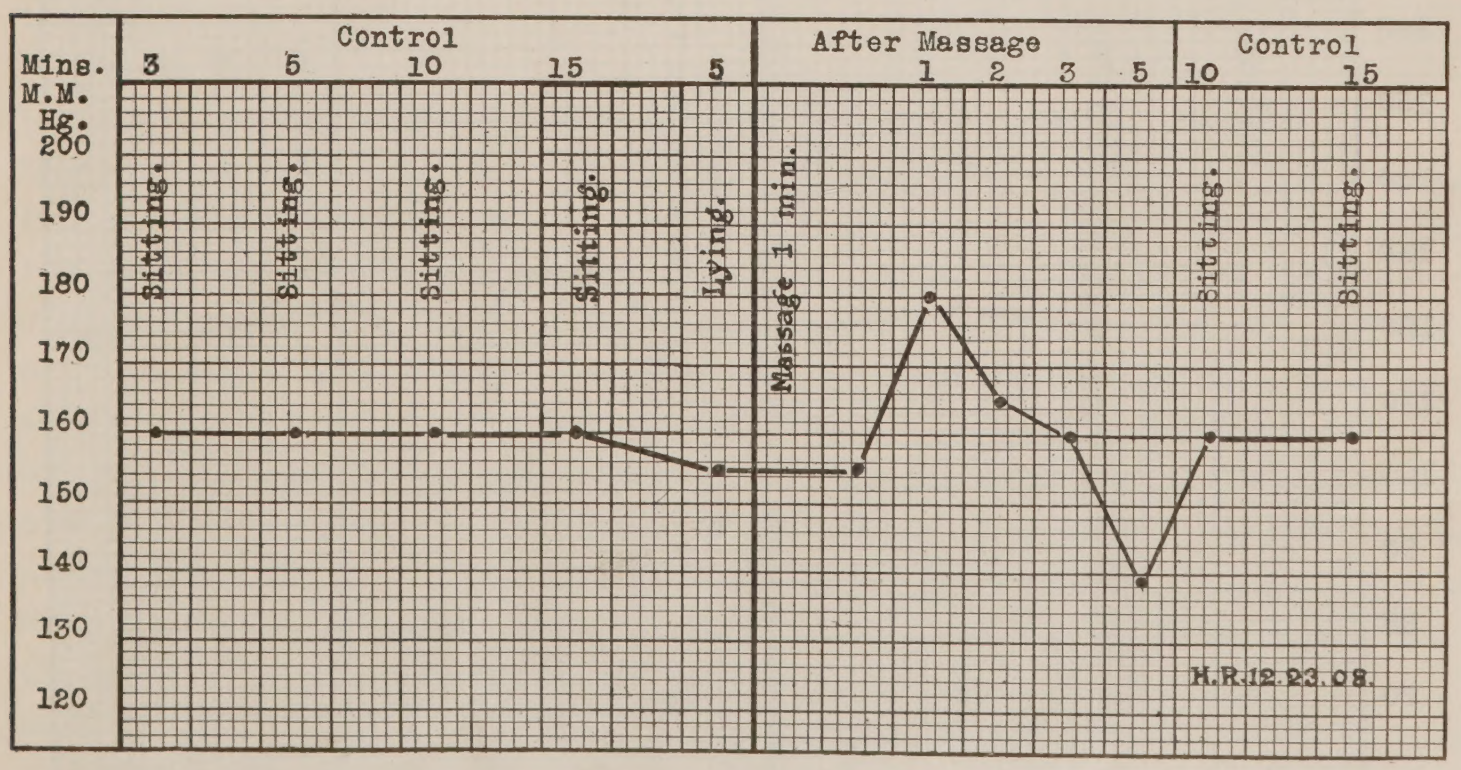

CHART 3. CASE I.
Showing the initial rise and subsequent fall in pressure after prostatic massage.

tained. No fall in pressure immediately following the massage suggested further observation on the time period of the reaction.

Exp. 3. The manipulations produced a little pain. One minute after the pressure had risen 25 millimeters, then gradually fell as is shown in the chart until five minutes when it reached a point 16 millimeters below the lying pressure.

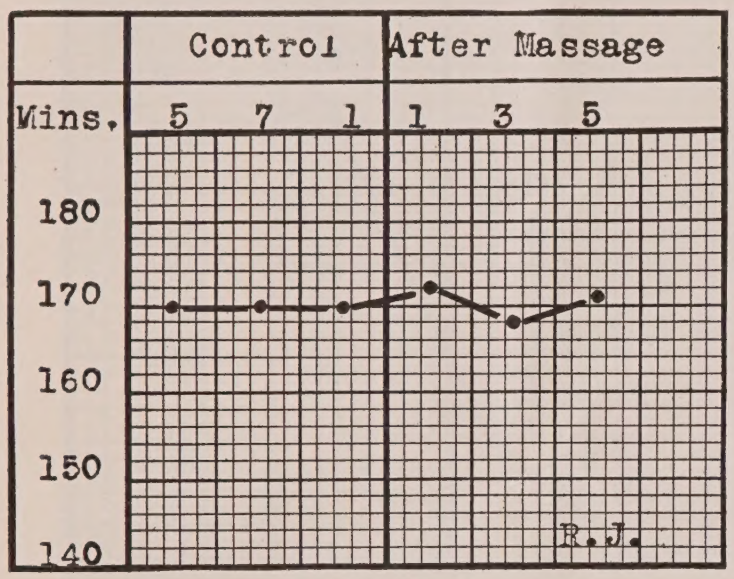

Chart 4. Case II.

After prostatic massage practically no change is observed in the pressure although the initial rise and subsequent fall are indicated.

Case II, chart 4 shows very little effect from prostatic massage, there is however a tendency to an initial rise and a subsequent fall in the pressure. Prostate negative.

Case III. Prostate slightly enlarged, groove not obliterated, lobes distinct. Centripital massage reduces it quickly almost to flatness with slight clear urethral discharge. The initial rise is well marked and sustained for two minutes, followed by a distinct fall at 5 minutes, back to the lying pressure in seven minutes. There was a corresponding rise in the pulse following the manipulation.

The immediate effect of prostatic massage is to cause first a rise in pressure followed by a fall which in some instances is quite remarkable, with a return to normal not later than ten minutes after the manipulations. Stimulation of the schneiderian membrane with the Faradic current, and the vagina, and rectum by manual stimulation have been shown to induce marked lowering of pressure. Pain increases blood pressure.

The impression has gained ground that arteriosclerosis is always associated with

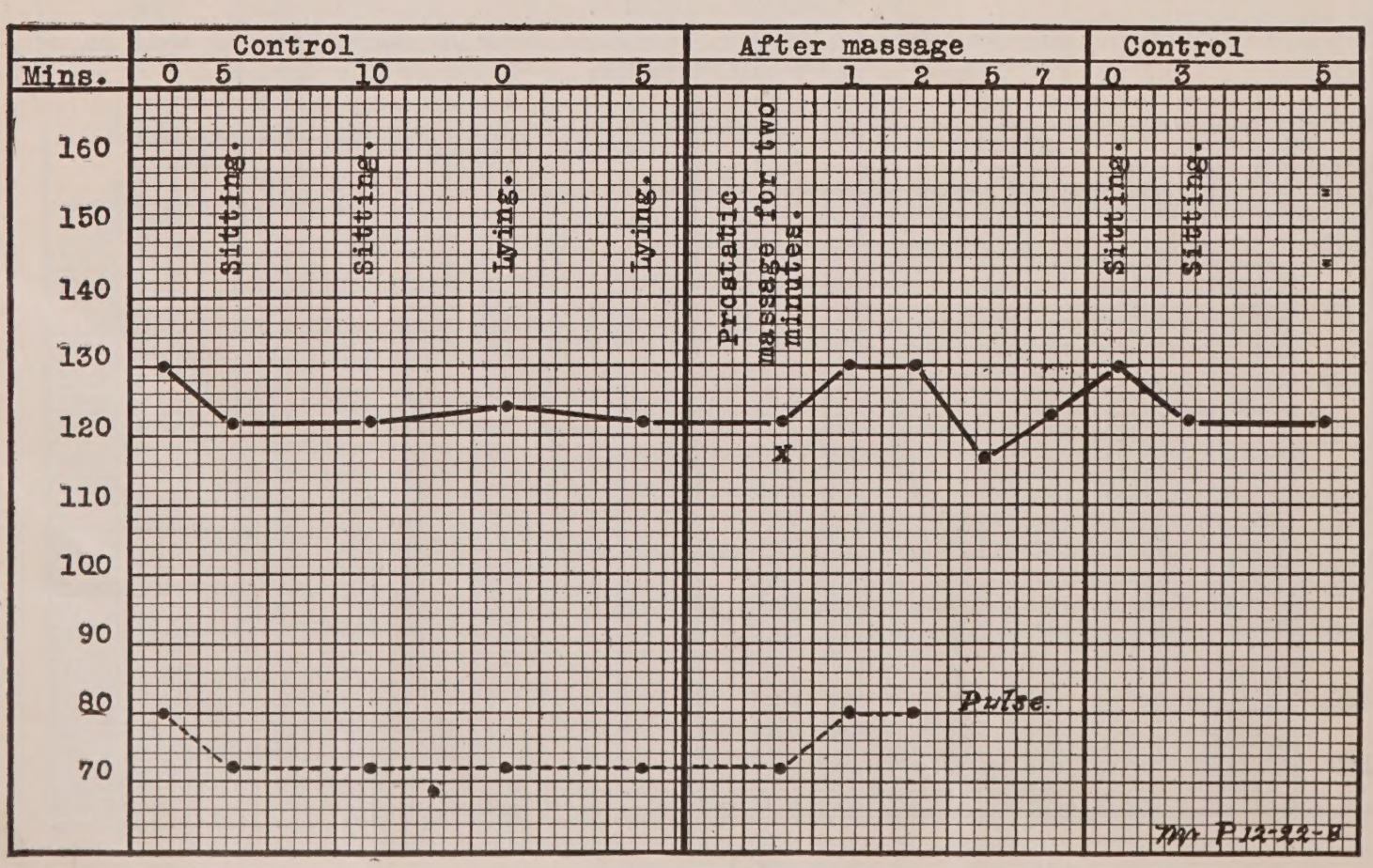

Chart 5. Case III.

high blood pressure. As a matter of fact arteriosclerosis may be about equally divided between the state of hypertonia and hypotonia. I have three cases of advanced arteriosclerosis at the present time with blood pressures varying from 90 to 120. The disease is marked in the peripheral arteries. The radials are round, and full, tortuous and palpable after compression. There is apparently no discoverable cardiac enlargement and no accentuation of the second aortic sound. These are usually cases of peripheral arteriosclerosis with little if any involvement of the capillaries or splanchnic vessels. On the other hand we may have high pressure with soft radials due to splanchnic involvement alone.

Should one picture a case of typical arteriosclerosis with hypertension he would group the following phenomena: high tension pulse, beaded hard arteries, palpable after compression, hypertrophy of the left ventricle, accentuated second aortic sound, signs of interstitial nephritis.

Treatment. In the treatment of high blood pressure I have made use of the nitrites—nitroglycerine, sodium and potassium nitrite. It has been proven that sodium and potassium nitrite and erythrol tetranitrite have a more prolonged action than nitroglycerine. The fall in pressure is slower and the subsequent rise delayed. For permanent lowering of pressure theoretically sodium and potassium nitrite are to be chosen. The method of treatment aims at repeated periods of pressure lowering with the hope that sooner or later the time will come when the continuous administration will cause a greater delay, in the pressure reaching its height. I am in the habit of giving three and four doses daily and continuing the remedy over considerable lengths of time, always controlling my dose by blood pressure records. When the pressure reaches what may be considered the low point sought the remedy is gradually withdrawn.

The nitrites should never be continued for long periods without systematic control. Some individuals are quite susceptible to their action. Some very important reports have recently been published regarding subnitrate of bismuth poisoning in children and in patients taking large amounts for radiographic purposes. These cases have all showed a pronounced methemoglobinaemia with more

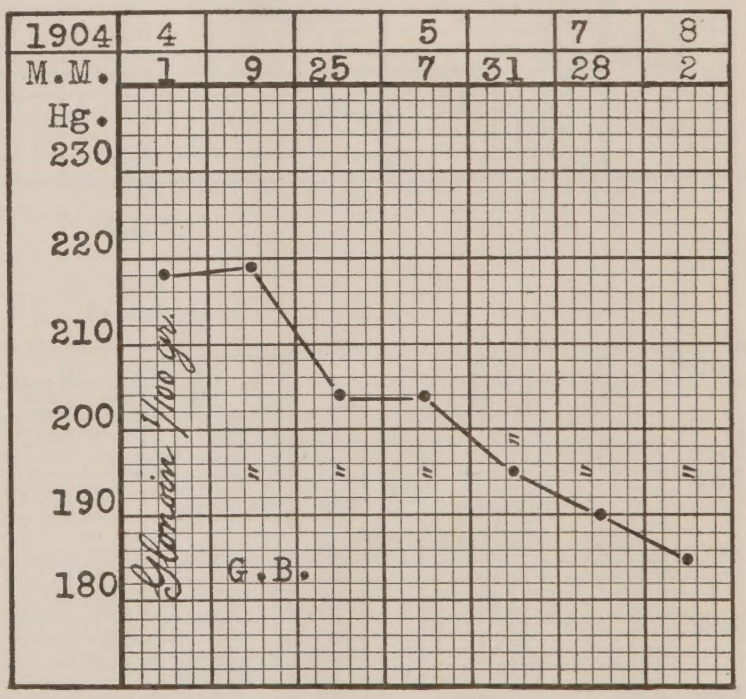

CHART 6. CASE IV.

or less cyanosis, collapse and in some cases death. It has been found that bismuth sub-nitrate decomposes very readily in children's stools forming nitrites and that X-rays decompose the nitrate setting free the nitrite. The methemoglobinaemia is due to the nitrite poisoning. The elaboration of so much nitrite in the organism must bring about a tremendous lowering of blood pressure. This is a point which requires elucidation.

I will give a brief outline of a few cases and illustrate them with lantern slides. As

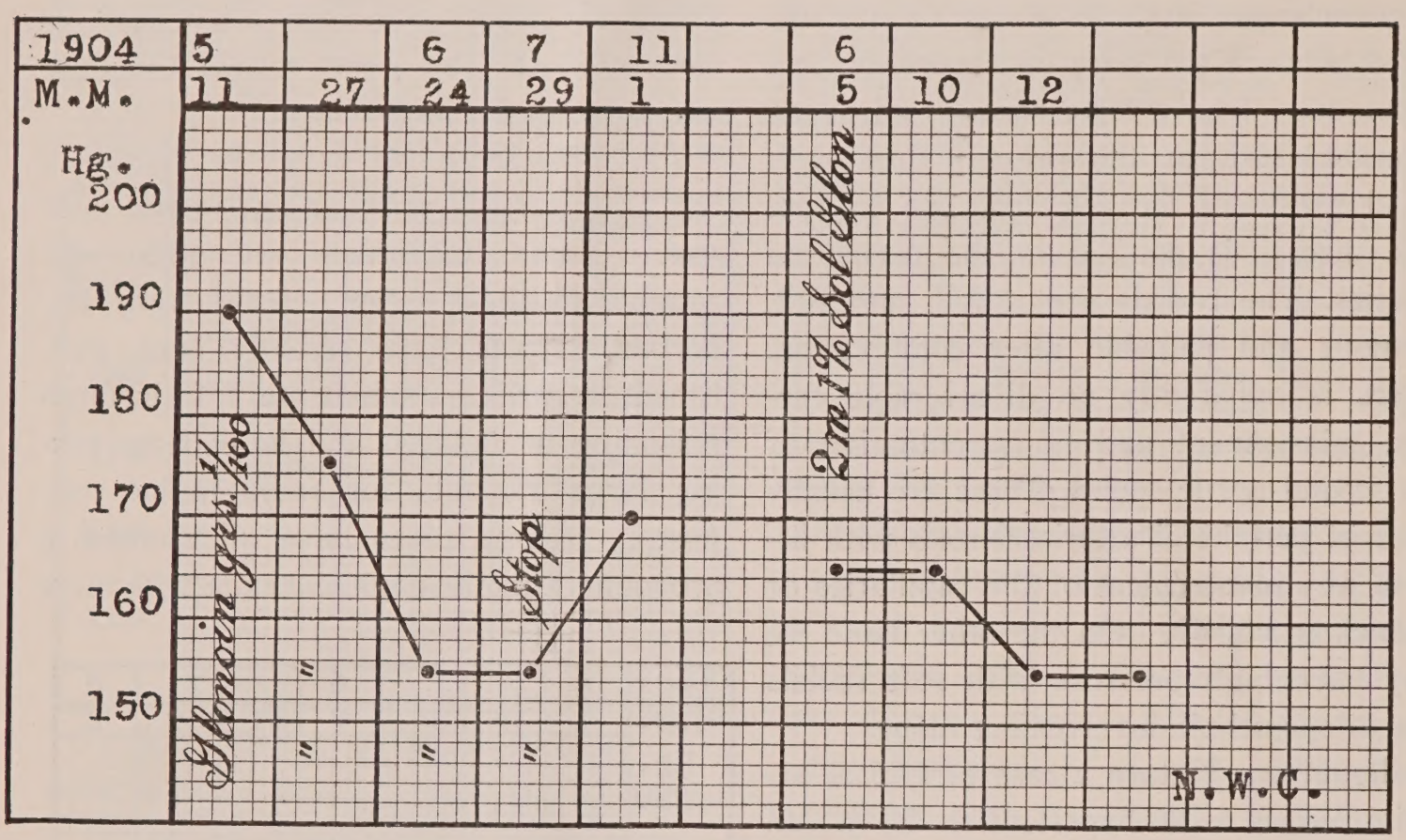

Chart 7. Case V.

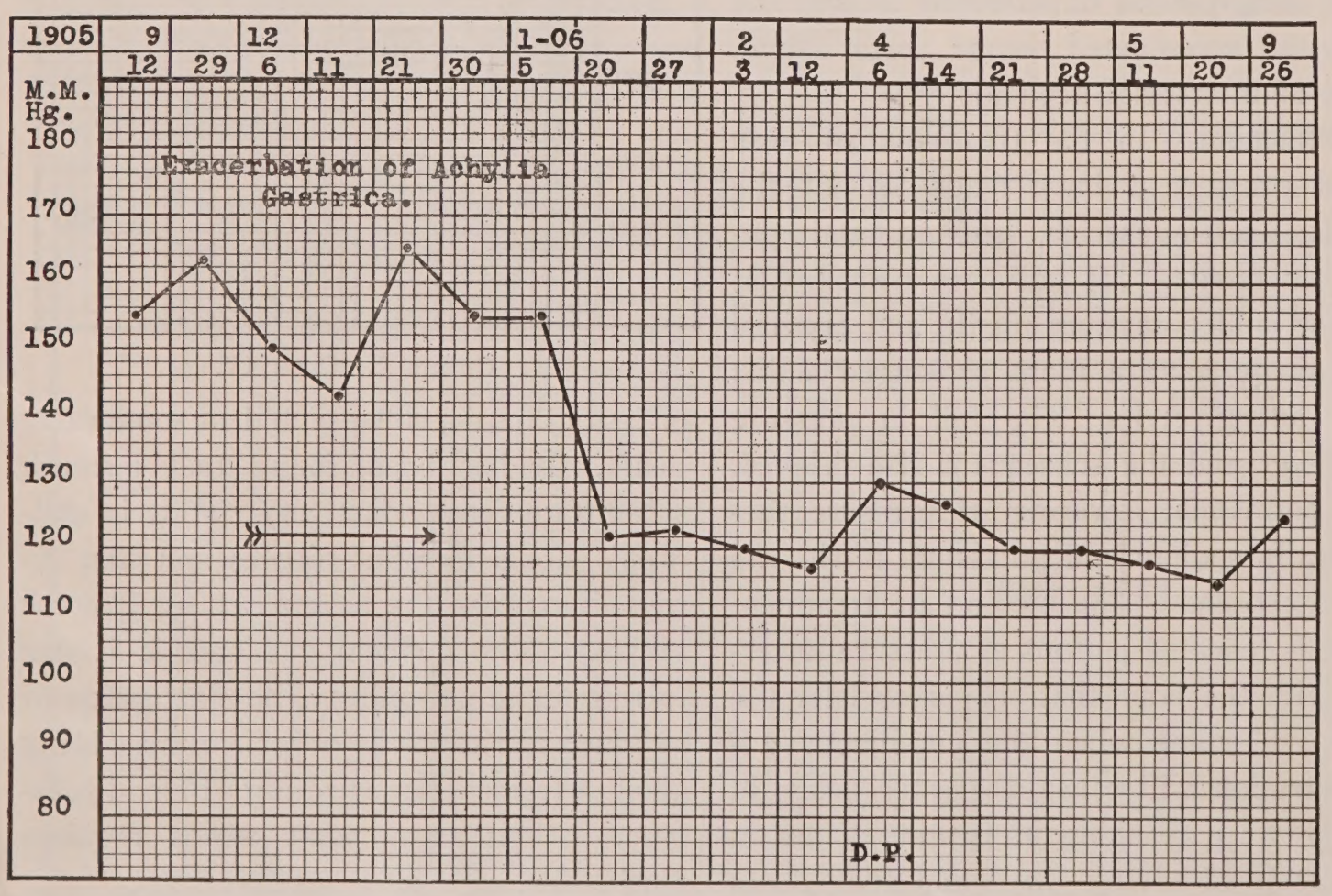

Chart 8. Case VI.

I wish to consider the condition of blood pressure as influenced by the nitrites, I shall not weary you with a detailed history substantiating the diagnosis.

Case 4. G. B. Aet. 67. Advanced arteriosclerosis, angina pectoris, the patient sought relief from dizziness, substernal distress, shortness of breath on exertion. He had to stop two or three times the abdomen and heart. The coronaries were calcareous and brittle, the heart was slightly enlarged. Urine and blood negative.

Case 5. Chart 7. N. C. Aet. 60. Arteriosclerosis. Chronic Gastritis. This patient sought relief from gastric distress, a sensation of fullness in the head particularly noticeable in the morning, confusion of ideas. His pressure was 190, pulse regular,

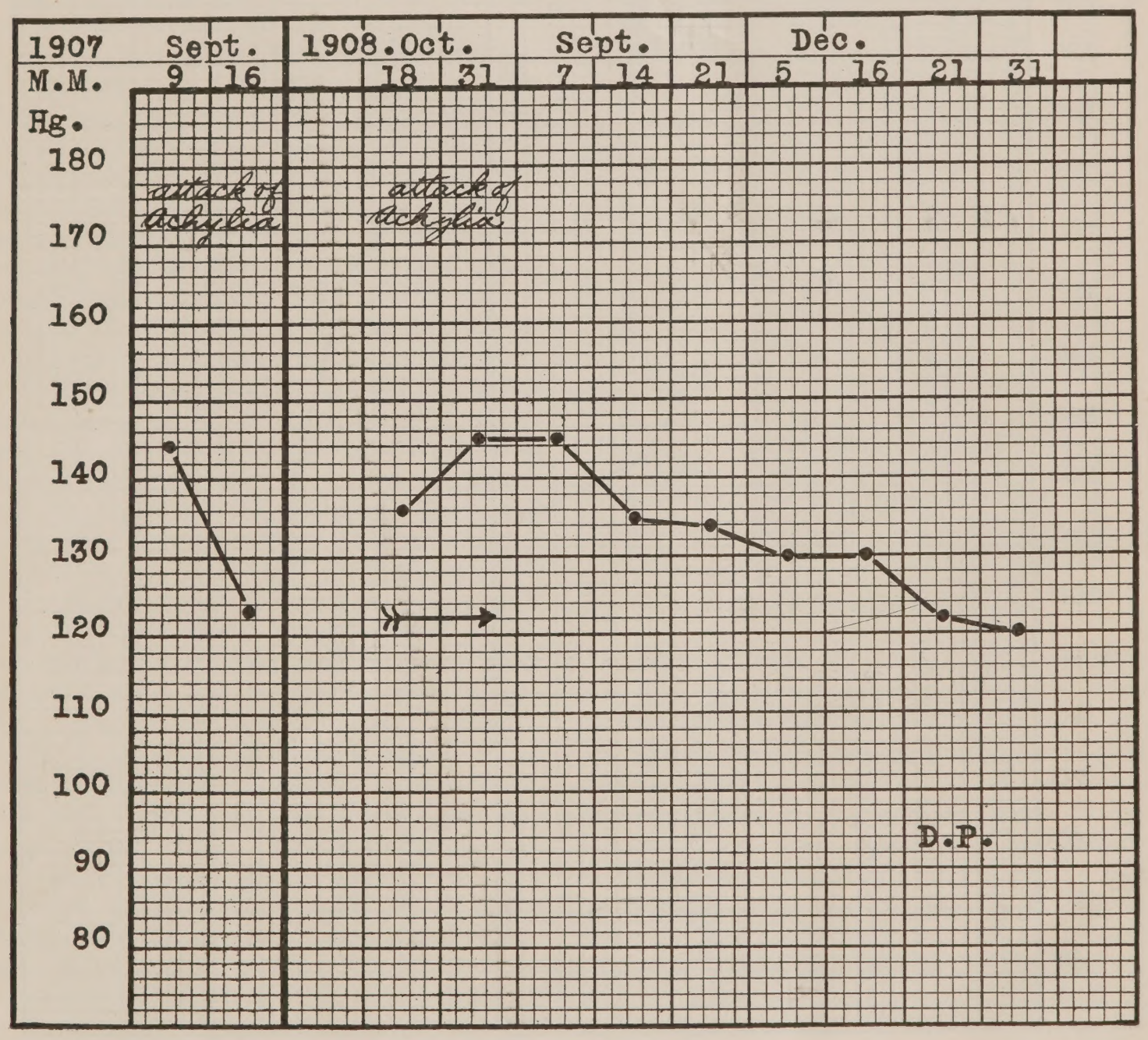

Chart 9. Case VI.

going as many blocks. No intermittent claudication phenomena. He was put on pil nitroglycerine 1/100 gr. after meals and at bedtime with the blood pressure changes noted in chart 6. In the fall he went to Cuba. I did not see him again until the following spring in consultation with Dr. Darling. He died after operation for impacted gallstone in ilium with ulceration. Autopsy was permitted on arteries palpable after compression, tortuous. He made steady improvement from his symptoms on spirits of nitroglycerine from 2 to 4 minims of the 1% solution, from May 11, 1904 to July 29. I did not see him again professionally until November 11, the pressure was 170, he was feeling well so I did not advise continuing the remedy. He returned the following June with a similar group of symptoms. Pres-

sure 165, symptoms relieved by nitroglycerine. He took a lake trip the latter part of June, returned home feeling better, but was found dead in bed one morning. No autopsy.

symptoms required constant watching. The attack subsided and he remained to all intents and purposes perfectly well until September, 1907, when he had another attack but of short duration. A third attack

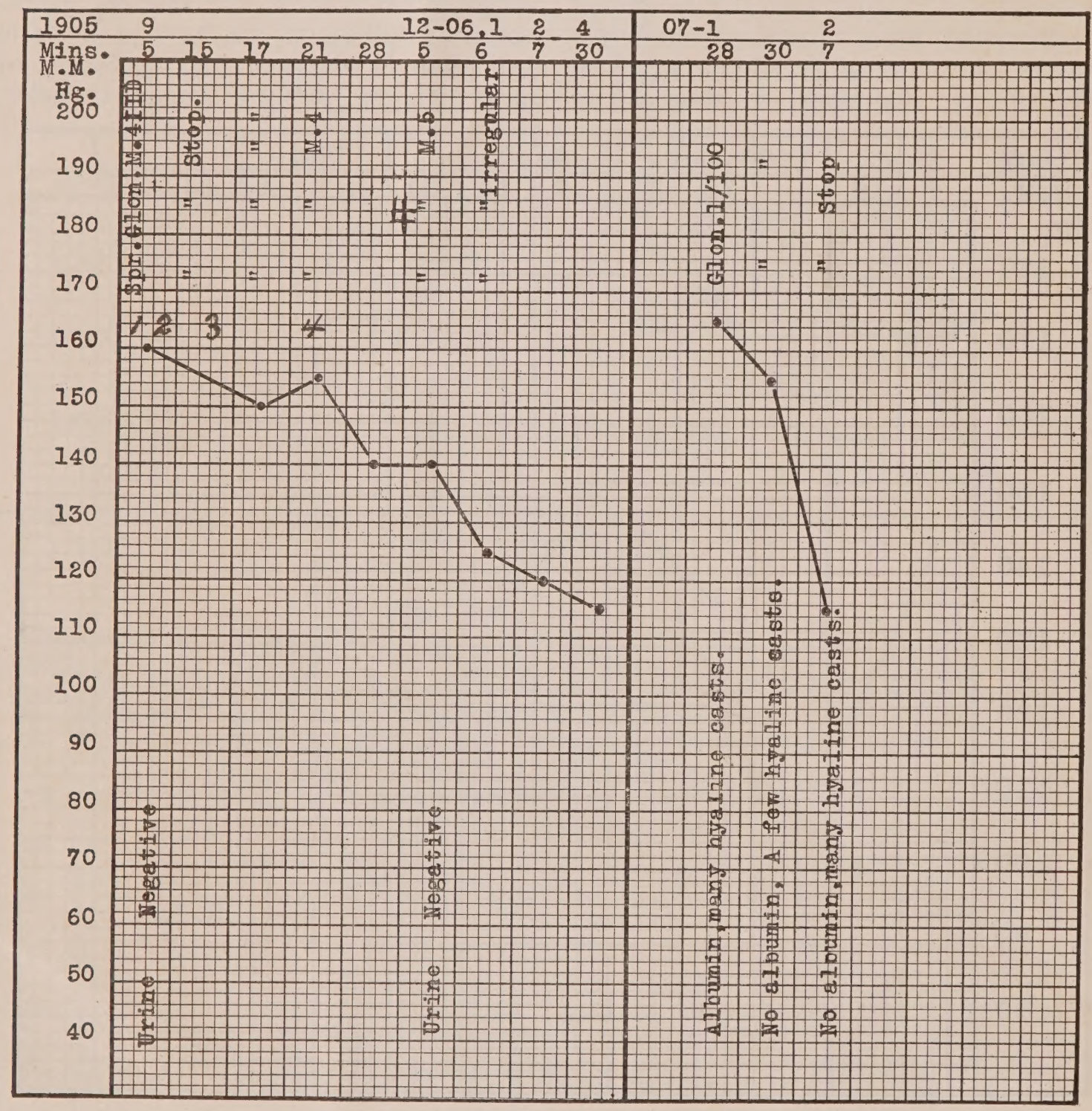

CHART 10. CASE VII.

1. Complained of cold extremities.
2. Complained of extremities being too hot, advised continue with glonoin.
3. Continued to complain of hot extremities, allowed to discontinue glonin.
4. Returned to glonoin.

CASE 6. Charts 8 and 9. D. P. Aet. 55. Achylia Gastrica. This patient had typical attacks of achylia gastrica with diarrhoeal stools. During the period from September 12, 1905, to January 5, 1906, the occurred in September of the following year. The patient had been abroad and had had a miserable summer. When I saw him in October the pressure was again high but gradually subsided with the abatement of

his symptoms. There was no attempt to reduce blood pressure in this case. He did not seem to be suffering from high pressure symptoms and his pressure was never excessively high. The records were kept as a routine measure and may illustrate how bodily states of various kinds may influence blood pressure. This patient now at 59 is a remarkably well preserved man with excellent arteries but with a well marked gastro-intestinal neurosis.

Case 7. Chart 10. Miss H. A. Aet. 57. Arteriosclerosis mild. Interstitial nephritis mild. Complained of sleeplessness, palpitation, gas in stomach, cold hands and feet, throbbing of the left temple, dizziness. The radials were slightly tortuous, easily compressed. She had a distinct hyperchlorhydria. During the first portion of the chart the urine was negative. I am unable to say that her hypertension was entirely due to her arteries. There was no accentuation of the aortic second sound. She did not sleep largely because she felt her heart beating. I put her on spirits of nitroglycerine. She returned two days later to tell me she must stop the medicine because her feet and hands were now "so hot." I discontinued the remedy for two days, then encouraged her to begin again. She made steady and seemingly permanent improvement from now on. January, 1907, she returned with the same group of symptoms and in addition distinct urinary changes, albumin and large numbers of hyaline casts. The effect of the nitrite is shown in the chart. February 7 was the last time casts appeared in her urine. I have examined the case several times since. There has been no return of albumin or casts. With these findings the diagnosis of interstitial nephritis can be made.

Case 8. Chart 11. A. H. Aet. 58. Arteriosclerosis, attacks of acute myocardial insufficiency valvular lesions. This patient was observed at irregular intervals from April, 1907 to June. He had a distinct hypertonia. He was put on nitroglycerine 1/100 gr. t. i. d. and was fairly faithful about taking it. The patient has now a well marked myocardial insufficiency. While taking the glonoin the pressure remained down.

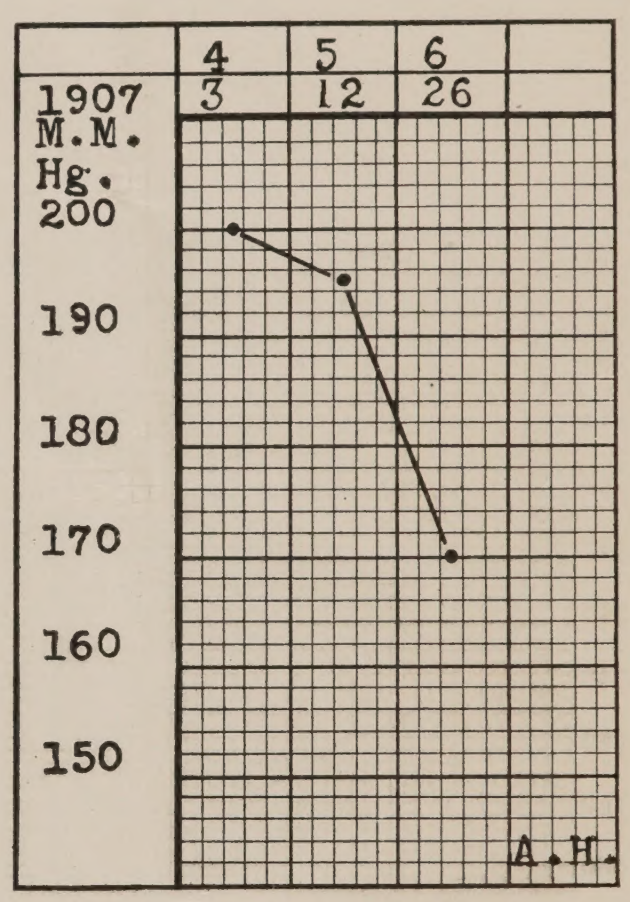

Chart 11. Case VIII.

Case 9. Chart 12. H. R. 64. Gastric neurosis, moderate arteriosclerosis. This patient is markedly subject to nervous influences. I have taken his pulse for months without finding it below 90, often much higher. Taken by himself at home 72-75. He has a marked hypertonia, fluctuations in his blood pressure are very great as will be seen by referring to the chart. There are no cardiac signs and no urinary changes. The nitrites have a marked effect in lowering his pressure as will be seen from his chart.

I should like to remark again that these cases are shown simply to illustrate hypertonia and the effect of the nitrites on this condition.

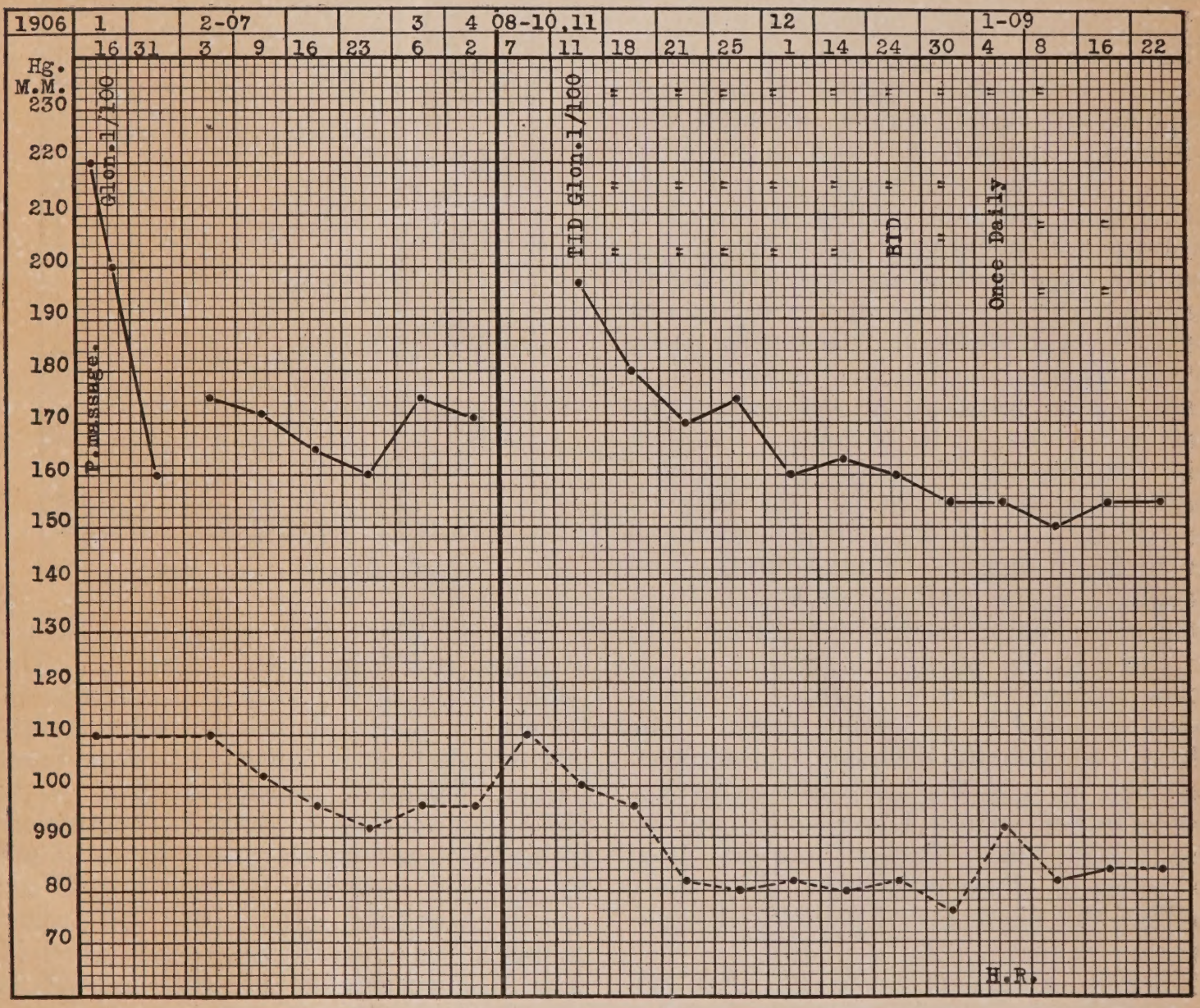

Chart 12. Case IX.

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